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THE OPTICAL

MAGIC LANTERN

— JOURNAL —

AND

PHOTOGRAPHIC ENLARGER.

A Magazine of Popular Science for the Lecture-room and the Domestic Circle.

Edited by J. HAY TAYLOR.

[Entered at Stationers' Hall.]

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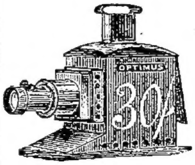

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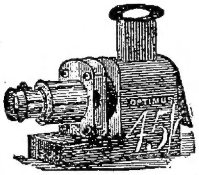

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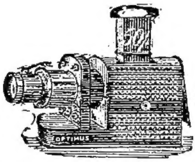

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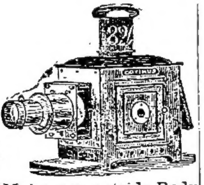

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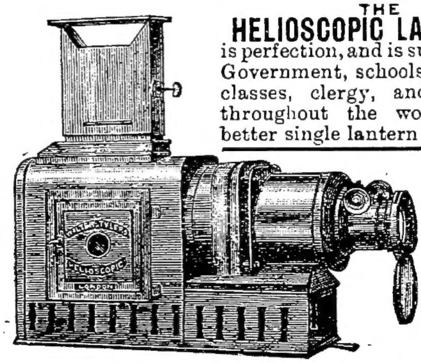

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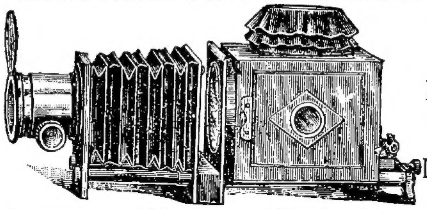

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THE OPTICAL
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EDITED BY J. HAY TAYLOR.

Vol. 4.—No. 46. [Entered at Stationers' Hall] MARCH 1, 1893. Price One Penny.

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Notices.

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NOTICE.

MANY CORRESPONDENTS STILL FORWARD THEIR COMMUNICATIONS TO THE OLD ADDRESS. WILL THEY PLEASE NOTE THAT OUR ADDRESS IS NOW

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Notes.

WE are indebted to Mr. Vicarcy for the following hint. He writes: "When attaching a blow-through jet to a star or branched gas bracket, the burners not in use can be readily blocked up by means of a cap or thimble made from a small piece of rubber tubing with the end plugged up with a piece of wood. Caps of this description are easily made and can be readily slipped over any burner that it is desired to close. Odd pieces of tubing can thus be utilised.

* * *

THE National Photographic Exhibition will be held at the Crystal Palace from April 10th to 29th. Photo apparatus, materials, pictures, &c., will be exhibited, and the opera theatre will be set aside each evening for the exhibition of lantern slides.

* * *

THE Seventh Annual Photographic Conference of the Camera Club will be held in the theatre of the Society of Arts on April 12th, 13th, and 14th, under the Presidency of Captain W. de W. Abney, C.B., D.C.L., R.E., F.R.S. On the 12th and 13th papers and discussions will be given, and on the 14th an exhibition of slides will be given in the theatre.

* * *

WE are informed that Mr. Frank Howard, of Wallingford, Berks., has accepted the post of Hon. Critic to the Lantern Slide Exchange Club (Hon. Sec., Mr. A. J. Richardson Summerville, Dore, Sheffield), in place of Mr. A. R. Dresser, of Bexley Heath.

Messrs. Arthur Schwarz & Co., of 9, New Broad Street, have been appointed the sole agents for the products of the photo department of the Actien-Gesellschaft für Anilin Fabrikation, Berlin, who are the manufacturers of Dr. M. Andeesen's Developers, Eikonogen, Rodinal, Diamidophenol.

* * *

The editor of the *Journal of Education* offers a prize of £10 10s. for the best essay on *the use of the lantern for class instruction.* Full details can be ascertained from the offices of that journal at 86, Fleet Street, E.C.

* * *

An interesting series of lectures on the science of animal locomotion will be given by Professor Muybridge at the Chicago Exhibition from May to October. The particular hall in which these illustrated lectures are to be given will be termed Zoopraxographical Hall.

* * *

During the last few months electric lighting has been rapidly coming to the front. The House of Lords has lately had ten clusters of Swan-Edison lamps suspended from the roof. Windsor Castle has been fitted with electric light. A special lamp has been designed to resist breakage by vibration. Electric clocks with pillars for transparent advertisements on the pillar supports are about to be erected in Vienna. The electric light has also been adapted for bicycles, private carriages, omnibuses, ticket collectors, and even certain of our "guardian gentlemen in blue" when on night duty carry lanterns fitted with electric light.

* * *

For all we know the burglar may carry a light of the same style as mentioned above, as he is said always to have the latest scientific tools. But the subject of electricity as a means of obtaining an illuminant for the lantern has remained pretty quiet; but when our abodes are supplied with the invisible fluid our readers may begin experiments which will result in the limelight being demonstrated at future scientific meetings as "a method adopted long ago" for obtaining an illuminant for projecting pictures by means of the optical lantern.

* * *

An exhibition of photographs and apparatus will be held by the Blackheath Camera Club at the Art Club, Blackheath (not the "Hare and Ant," as stated in our last issue), on 3rd and 4th inst., when medals will be offered in seven different classes. Particulars of these can be obtained from the Hon. Sec., Mr. C. W. Piper, A.R.I.B.A., 46, Shooter's Hill Road, Blackheath, S.E.

The National Thrift Society (1, Finsbury Circus, E.C.), now use lantern illustrations at most of their lectures throughout the different suburbs of London. During the past year they gave about eighty of these lantern meetings, at each of which the lanterns were provided and manipulated by Mr. A. E. Wade, of 177, Walworth Road.

* * *

By means of Archer & Son's dissolver, a single lantern, a good supply of photographs, and an interesting lecture, Mr. C. E. Rendle, whose thoroughly practical articles are often to be found in our pages, took the members of the Unity Society, Islington, on an interesting trip from London to Glasgow. The dissolving, by means of the single lantern, was a decided success, and about 100 slides were projected.

The late Mr. Albert Wm. Scott.

We regret to record the death, which took place at Cardiff on February 5th, of one, whose name and inventions in connection with the warm-air saturator, the Verak, &c., are so well-known to our readers.

Mr. A. W. Scott was born in 1860, and when a boy, was always of a studious nature, and out-door games seemed to have little attraction for him. At fourteen years of age he gained first-class honours at the Cambridge local examination in mathematics, chemistry, and mechanics. He then entered a factory at Birmingham to obtain the practical knowledge of an optician, and afterwards assisted his father in that line of business. Meantime, he became interested in photographic and lantern

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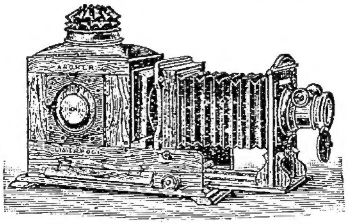

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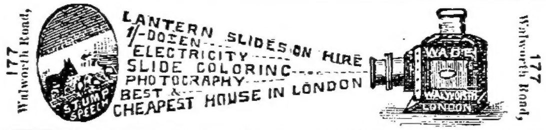

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matters, and ultimately invented the Verak camera, which was described in our columns of February, 1891, and the warm-air saturator, which is well-known to our readers.

Since 1885 Mr. Scott had not enjoyed very good health, but still he kept up his spirits, and determined to make a name for himself throughout the world.

The Royal Institution.

REMARKABLE EXPERIMENTS DISPLAYED BY THE LANTERN.

AT a lecture at the Royal Institution on "The Liquefaction of Atmospheric Air," by Professor Dewar, on the 20th January last, the speaker demonstrated by means of a lantern experiment, the action of a magnet upon liquid oxygen and liquid atmospheric air.

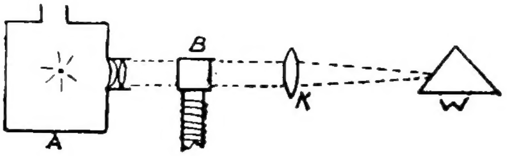


Fig. 1.

A side view of the arrangement of the apparatus is represented in Fig. 1, in which A is the electric lantern with lenses adjusted to give a parallel beam passing between the movable poles of the electro-magnet B. An image of the shadow side of these poles was then projected on the screen by means of the lens K, and the inversion of the image on the screeen prevented by means of the erecting prism W.

The arrangement of the apparatus between the poles is represented in Fig. 2. In this cut, A is a rectangular block of glass, with a cup-shaped hollow in its upper surface; N and S are the poles of the electro-magnet. The hollow in the top of A was filled with liquid oxygen which was dropped into it from a pipette. Then, every time the current was sent through the coils of the magnet, the liquid oxygen sprang up to the poles as at KK, and its shadow upon the screen appeared as a black bubbling mass.

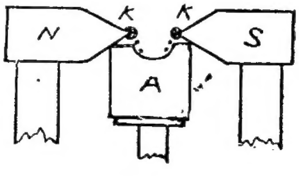


Fig. 2.

Nitrogen is not magnetic, and when Professor Dewar substituted liquid common air for the oxygen of the previous experiment, the magnet dragged up the nitrogen with the oxygen, and the bubbling continued as before, but as liquid nitrogen is more volatile than liquid oxygen, the nitrogen boils away first under normal atmospheric pressures and temperatures, and the greater part of the oxygen boils away afterwards.

When, in this lantern experiment, a piece of cotton-wool soaked in liquid oxygen was held suspended at the end of a thread between the poles, the mass was attracted to whichever pole chanced to be nearest, and that pole proceeded to "suck" the oxygen—so to speak—out from the wool; the boiling liquid thus removed from the wool remained, some of it boiling on the pole, and the rest falling in drops into the glass cup below.

In the experiment already described, it will be noticed that an erecting prism was used, because, said Professor Dewar, he had found that when the illustrations were exhibited upside down, he had found that some strangers occasionally thought that he was using the apparatus downside up. So long as the projections would impart the information they were intended to furnish, Royal Institution lecturers have usually, in the past, not been over particular in the technical quality of the images; this was especially noticeable in a lecture some time back on the Forth Bridge, in which a lantern was used from the gallery of the theatre, and in which the projection lens, probably of old-fashioned make, and perhaps on the premises from nearly the beginning of this century, gave anything but a flat field, so that the edges and centre of each picture were never in passable focus at the same time.

Probably the most remarkable experiment ever displayed by the use of the lantern, was one in Professor Dewar's lecture in which by means of intense cold, common air was liquefied in an open test-tube at the ordinary atmospheric pressure. So cold was the test-tube made that the air could be seen condensing against its sides in tears, and then trickling down, until at last half an ounce or thereabouts of liquid air had collected at the bottom of the tube. This was done by fixing the tube in a hole in a cork, by which it was held in suspension inside a larger tube, which tube was partly filled with liquid oxygen. Through the channel formed by a little piece of bent glass tube, also passing through the cork, a vacuum was brought to bear upon the liquid oxygen, the evaporation of which was then so increased, as to produce cold enough to liquefy the common air of the theatre, inside the smaller test-tube.

At the close of last year there was much difficulty in showing such experiments by the aid of the lantern, because of the condensation of the moisture of the air upon the outside of the glass vessels and apparatus used, so that they were quickly coated with ice or hoar-frost. India-rubber tubes get so hard and brittle with the cold, as to snap like clay pipe-stems with the slightest pressure. Recently, Professor Dewar has found that by making all his glass vessels double, that is to say, one vessel inside the other, and then producing a vacuum in the space between the two vessels, radiation of heat through the vacuous space takes place with exceeding slowness. An ordinary vacuum is useless for the purpose; it must be exceedingly high. By experiment, he found out how to produce a vacuum higher than any previously obtained by man, far higher indeed than any of those employed by Mr. Crookes in his radiometer and other researches. Professor Dewar does this by a modification of the old method of Torricelli. At the top of a barometer tube is a small bulb, and above it a large bulb; the whole arrangement is filled with mercury free from air, and the bottom of the inverted tube dips into a vessel of mercury. The mercury then sinks in the tube to the level at which it is balanced by the outside atmospheric pressure, leaving the two bulbs at the top empty, or rather, filled with a trace of vapour of mercury. He heats the bulbs, then with a flame seals the tube just below the small bulb, and removes both the bulbs, which now contain nothing but the trace of mercury vapour, highly attenuated by the heat which had been applied. Next, he gently heats the larger bulb, and at the same time paints the outside of the small one with a tuft of cotton-wool, soaked with liquid oxygen.

The intense cold produced by the evaporation of the oxygen, freezes the trace of mercury vapour, so that it forms a metallic patch, like a mirror, on the inside of the small bulb; the short piece of tube connecting it with the large bulb is then sealed by a flame, and the two bulbs are separated from each other. Thus the large bulb is left with a vacuum so perfect that there is much difficulty in producing a glow or other electrical discharge within it; the usual effect of trying to do so is but to make the glass of the bulb fluorescent.

Professor Dewar has never fully described in public the details of the machinery used in obtaining liquid oxygen and common air in bulk; on a small scale they were first liquefied years ago by continental experimenters. In the laboratory Professor Dewar has some powerful compressing and vacuum pumps, the pistons of which work in series. In other words, in the compressing operations, the first and largest piston compresses the gas into the next and smaller piston, and this again into the third and smallest piston, which compresses it into the receiving vessel. At the higher pressures, the abnormal pressures behind two of the pistons ease the strain on the valves which would be produced had they but the normal atmospheric pressure behind them. By his appliances he first liquefies nitrous oxide; then, by its evaporation and by pressure, liquefies ethylene, the illuminating constituent of coal-gas; then, by the rapid evaporation of ethylene and by pressure, he liquefies oxygen. By the rapid evaporation of oxygen, as already stated, he is able to liquefy air at the ordinary pressure. Perhaps, by the evaporation of nitrogen, and by pressure, he may, hereafter, be able to liquefy hydrogen in bulk. Nitrogen, like carbonic acid, can be obtained in a solid state.

Having obtained his liquid oxygen or air in the laboratory, the difficulty is to convey them without much loss to the lecture theatre, which is perhaps twenty or thirty yards off. They are conveyed in metal pipes, and as the air we breathe is intensely hot compared with the temperature of these liquids, the latter are cooled again in the theatre, in the concentric sections of a copper closed vessel, in the outside compartment of which nitrous oxide is evaporating rapidly, to somewhat protect the innermost compartments from the heat of the outside air. From this vessel, by means of taps, the liquids are drawn off as wanted for the experiments. The liquids evaporated to produce cold in this concentric series of vessels, do not escape into the air, but through larger pipes are conveyed as gases back to the laboratory for compression and use over again. Thus it is a closed system, as in the ammonia freezing machine. When liquid ethylene is poured upon water at the ordinary temperature, there is a slight explosive noise, so hot is the water in relation to the cold liquid; the noise resembles that which would be produced by letting a large red-hot plate of iron fall on the surface of the water. When liquid oxygen is poured on water, so cold is it that it assumes the spheroidal state, consequently does not touch the water, and makes no noise, but the vapour of each of its drops makes for that drop a little cup of ice, in which the liquid oxygen floats on the water. The sensations of extreme heat and of extreme cold are the same, and in early experiments one of Professor Dewar's assistants, Mr. Lennox, had his hands severely burnt by liquid ethylene falling upon them.

What with the labour required for days; what with the incessant care necessary; and what with the cost of the apparatus, these experiments are exceedingly expensive. The Goldsmiths Company has just given £1,000 towards the cost of the continuation of the researches.

Sir Frederick Bramwell presided at this lecture, and among those present known in the photographic world were Mr. and Mrs. William Crookes, Capt. Abney, Dr. and Mrs. J. Reynolds, Professor Meldola, and Dr. and Mrs. William Huggins. The theatre of the institution was crowded in every part.

——:o:——

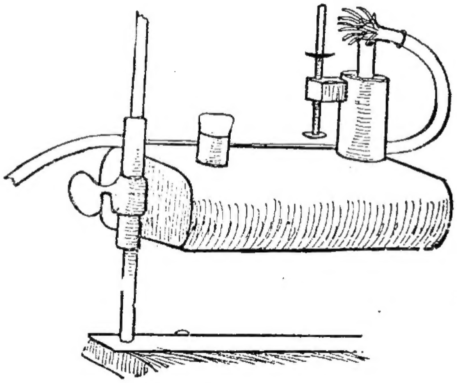
A Convenient Spirit Jet.

By G. W. Smith.

I have a small and exceedingly convenient form of spirit jet, which I have not seen illustrated in any list, but which is a great boon to those who may wish to use the limelight in a building not supplied with house gas.

This jet, of which I give a sketch, was made by an old friend, Mr. Thomas Gulliver of Swansea, a well known old lantern operator and enthusiast upon matters connected with lanterns and lighting.

Unlike the spirit jets which are commonly used, the reservoir which contains the spirit is not made on the fountain principle and placed at the back, but goes bodily into the lantern. With it there is no fear of the wick having an insufficient supply of spirit if the lantern happens to be slightly tipped up in front, and there is absolutely no chance of the spirit overflowing and taking fire.



I think many fail to get a good light with a spirit jet, through not getting a good flame from the spirit before the oxygen is turned on. The wick should not be too tight in the tube so that spirit may burn up *freely*. I find it best to draw out the wick so that the oxygen blows through the centre of flame, if you don't get a good flame, you cannot burn enough oxygen to heat the lime well, and if there is not enough heat a good light cannot be obtained, a little trouble must therefore be taken to get the flame just right, when you will get a light almost or, quite as good as with a blow through (house gas) jet.

The tank or reservoir holds about 8 ozs. of spirit, and this I find will give an even and steady light for nearly one hour and three quarters, during which time about three feet of oxygen are consumed.

The reservoir measures 4½ by 3½ inches.

When used constantly in one lantern it is perhaps best to fix the lamp at the desired height to be central, on a solid base, as one has then merely to slide this into its place in the lantern without fear of any adjusting being required. Where house gas cannot be obtained this is far preferable to a lamp which requires constant adjustment and gives off that unpleasant smell which is so much against the use of oil as an illuminant for the lantern.

I always endeavour to be on the safe side of everything, so have adopted the plan of covering the top of the reservoir with a sheet of asbestos to keep the spirit from getting over heated; not perhaps that this is necessary, but by taking every precaution ones mind is set at ease, and the mind can then more effectively be brought to bear upon the subject in hand.

——:o:——

New Apparatus, &c.

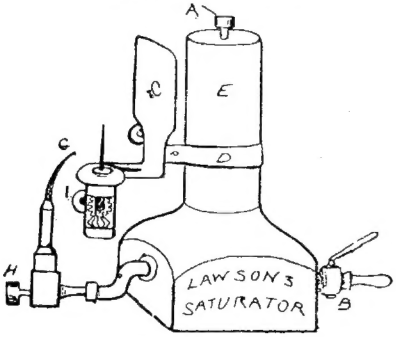
Lawson's Saturator.

On a previous occasion we gave a description of a saturator devised by Mr. Lawson, of Newton-le-Willows. Although that saturator answered its purpose well, the inventor has of late been adding improvement after improvement, and has now brought it to a high point of excellence.

A short time ago we received the apparatus from Mr. Lawson, and after repeated trials and experiment as to its safety, have decided to adjust it to our editorial lantern permanently.

A glance at the illustration of the old form, contained in our issue of May, 1892, and also at that in this number, will show that the apparatus has assumed a more handsome aspect. Various adjusting screws have been superceded by a regulating tap, and an arrangement added by which the use of limes of special shape is avoided.

The patent saturator as now shown, stands about 7 inches high, and is 3½ inches wide at its base: while its length from tip to tip is 10 inches, and can be adjusted to go into any lantern. It is beautifully made in polish gunmetal; the various parts of which are—E, body of saturator; D, adjustable clamping band round saturator which holds the lime support; C is a movable plate or protector, which also acts as a heat conductor. The lime cylinder which is placed on F is turned by the milled head I. The nipple is shown at G, which can be closed if desired by the action of the screw H. The saturator is charged with benzoline, &c. at A; and the gas inlet is at the tap B.



To operate, from 3 to 4 ounces of ether or benzoline are poured in at A by means of a small tube provided for the purpose, after which the saturator is turned upside down, and the spirit drained out (this is quickest done by blowing at tap to start it), after which about 1½ ounce of ether or benzoline is added, and A screwed down tightly. The handle of tap D is then opened by placing it in line with the tube which is attached to the oxygen supply. After this has been allow to be on a moment, a light can be applied at the nipple. By turning the handle of the regulating tap B slightly to the right, a supply of pure oxygen is admitted to the mixing chamber, and the lime becomes incandescent. This light improves as the apparatus becomes warm.

In the course of a letter received from Mr. Lawson he suggests that the nipple be turned away from the lime at the time the light is to be put out; but this we do not find necessary, as by slowly and gradually turning the handle B to the right, we first increase the supply of oxygen, then diminish the supply of saturated gas and finally cut off the gas completely without the slightest pop, but if it is done quickly a little pop is given, which, however, is not worthy of notice.

We understand that Mr. Lawson has arranged a special form of saturator for use with a triple lantern.

Lecturer's and Dark-room Lamp.

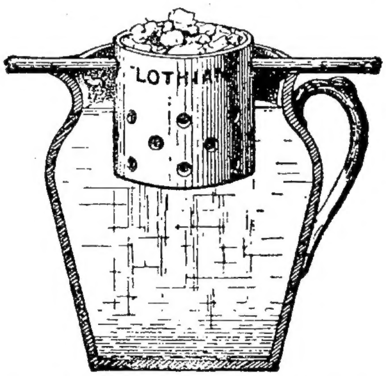
The cut shows a convenient lamp manufactured by Messrs. Butcher & Sons, of Blackheath. It is very compact, does not burn oil, and has no breakable parts. For reading purposes the reflector causes the light to fall upon the book or MSS.; whilst the red light at back indicates to the operator when to change the slide; whilst when required for dark-room work the front is closed, and the red light at back employed. When noticing in our last issue the print mounting solution, our printers described this firm as Butler & Sons, instead of Butcher & Sons.

Cover Glasses for Slides.

A great trouble with many cover glasses is, that they are not always of exactly the same size. Messrs. Houghton & Son, High Holborn, have sent us a sample package of those they make. They are absolutely of the same size.

Lothian Rapid Solution Jar.

Mr. A. H. Baird, of Lothian Street, Edinburgh, has placed on the market a porcelain jar with perforations to facilitate the making of solutions of hyposulphite of soda, &c. As shown in the diagram, a glass rod or stick is placed through the large holes in the jar by which it can be suspended into a jug containing water. The jar having been filled with, say, hypo, it may be left until all the contents have been dissolved.



Centring Jet.

A new jet for attachment to the back of a lantern is about to be introduced by Messrs. Watson & Sons, of 313, High Holborn. A

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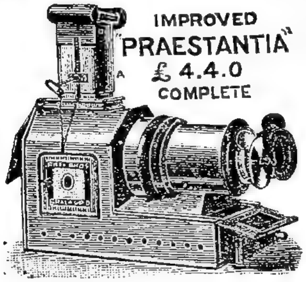

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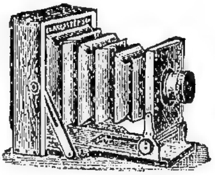

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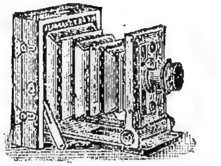

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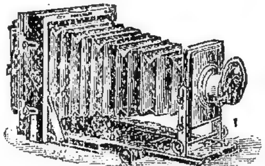

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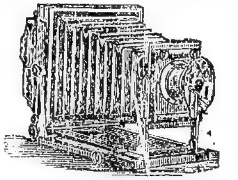

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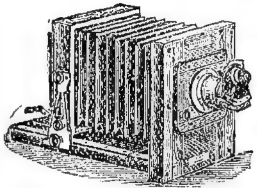

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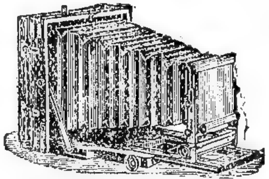

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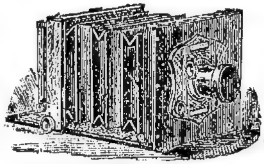

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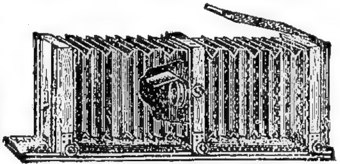

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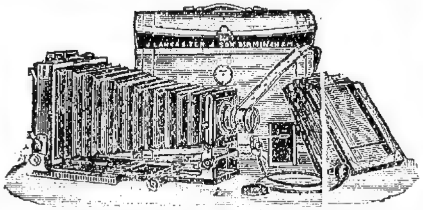

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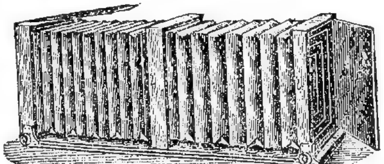

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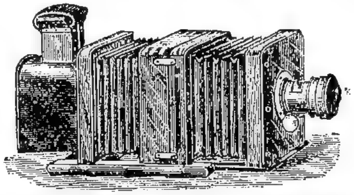

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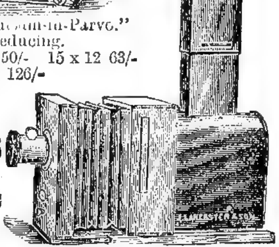

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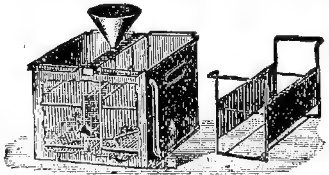

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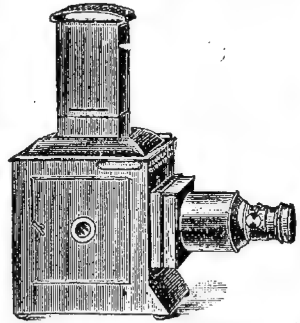

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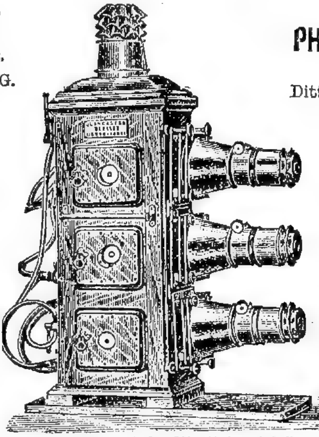

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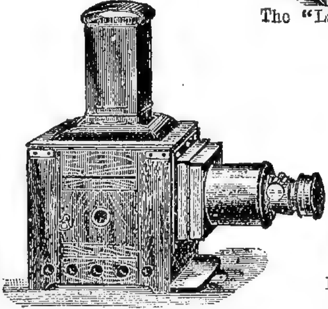

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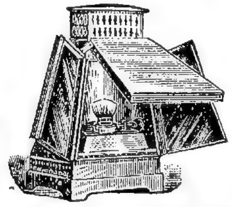

Lancaster's New "Rubralux" Lamp. (Patent).
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collar with a toothed wheel is fastened at the back of the lantern, and into this is geared a screw which is attached to the jet rods in such a manner that the wheel will rack the screw and jet up or down as desired. This movement is effected from the side of lantern, and the jet having been moved sufficiently sideways it can immediately be clamped in a very rigid manner, simply by turning a milled head, which is also placed at the side of the lantern.

——:o:——

How to Enlarge.

By J. S. Spencer.

The optical lantern, although exceedingly useful for enlarging work, is not so popular as other methods when large numbers of pictures have to be made; why, it is perhaps not so easy to determine, unless the objection is the extra care that has to be exercised in using the lantern. There is, no doubt, that most unexceptional work is produced by the lantern; but to the commercial worker of to-day every little extra trouble is regarded as a defect, and that process which can lay the greatest claim to simplicity, is adopted.

The plan I am about to describe merits this claim: two rooms are required, or one divided by a partition into two distinct spaces, for a reason that will be presently obvious—magnesium ribbon being the source of light. The advantages of using an artificial light where much work has to be done is very pronounced. Exposures can be calculated to a nicety, and dull, dark days are of no consequence. The busy photographer can make his enlargements after the light fails in his studio for other work which, when working single or short handed, is not one of the least recommendations.

We proceed to fit the room or rooms in the following manner: An aperture of about a foot square is made in the dividing wall or partition, fitted with a frame containing a good condenser of sufficient size so that no light can pass except through the condenser. The room in which the magnesium is burnt should be capable of being well ventilated by a window or trap in the ceiling, or both; the latter is easy enough if the rooms happen to be at the top of the house, but if not, a window will let out the smoke better than any other method, unless a special ventilating arrangement is constructed.

A wide tube conducting the fumes into the chimney is often advocated, but unless it is a chimney with a good draught, the smoke is not carried away properly. A fire in the grate creates a draught, so that in Winter time the plan may work well, but on the discontinuance of fire in Summer there is often a difficulty in getting the arrangement to work properly. The room in which the enlargement is made, is of course dark, or illuminated with some non-active light. The ordinary dark room is often used for this purpose, but there is no doubt that rooms specially fitted for enlarging are much more convenient in every way. In this apartment a small table is fitted just below the opening containing the condenser, which should be about four feet from the ground, upon which a quarter-plate camera supplied with a good rectilineal 5×4 lens can be adjusted; the back of the camera having been adapted to hold the negatives or transparency in the proper position to be enlarged, fits up close to the condenser, so that no light except that through the cliché passes through the lens or into the room.

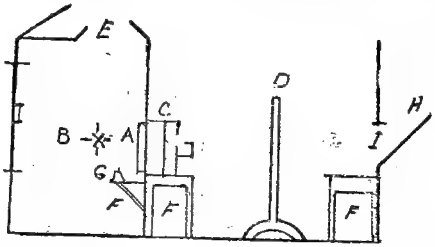

Fig. 1. A, condenser; B, magnesium light; C, camera; D, easel; E, ventilator; F F F, small tables; G, spirit lamp; H, reflector for daylight work; I, window.

The lens pointing inwards can be easily manipulated for focussing; a cap glazed with yellow glass will permit the projection of the image on to the screen without risk of the light periodically effecting any other sensitive surface that may be exposed in the room that it may to fall on. An easel running to and fro on rails parallel with the lens allows the proper length adjustment being made for the size of the enlargement, the final focussing being done with the objective.

Magnesium ribbon is perhaps the best illuminant, a definite length or quantity giving a definite amount of exposure, the ribbon being held during combustion in a pair of pliers, or, what is better, a short length of metal tubing through which it can be pushed as it consumes, and at the same time kept moving about over the condenser, at a few inches from it. Ground glass or tracing paper is sometimes used for screens, but with the exception of somewhat lengthening the exposure there is no perceptible difference in the results. Anyone watching the light as it dodges about over the enlargement would conclude a very uneven picture would be produced; on development it will, however, be found quite equally exposed. If the light was not kept moving this irregularity would probably cause trouble—The magnesium being burnt in a room isolated from the operating chamber, no disagreeable effects are produced on the operator or the air of the room, a matter of some consequence if exposures rapidly succeed one another.

The easel consists of a frame supported on feet, between the uprights of which a black board of sufficient size can be raised and lowered and kept in position by a clamping screw. The board is provided with a ledge along the bottom to act as a support for glass plates, and at the top is attached a slotted lath with a bevelled end tightened with a binding screw to press against the upper edge of the plate and keep it in position. With paper a few drawing pins are all that is necessary.

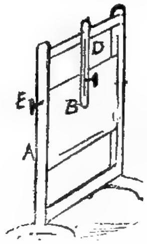

Fig. 2. A A, framework to support the board B, which runs in grooves F; C, ledge to support plates; D, slotted lath to keep plate in position; E, clamping screw to keep board B in place.

When all is in readiness a small piece of the same kind of paper or plate to be used for the enlargement is placed on the easel where the most important part of the image falls and when there is most variety of contrast—a definite quantity of magnesium is burnt, and the small test paper carefully developed, it can then be seen if the exposure is right or what modifications are required. The enlargement proper can now be done with a correct exposure, and with that same negative or transparency, and the same amount of magnesium, the same results may be ensured with the greatest uniformity,

If a lantern is used the centreing of the light must be carefully done, so that the disc of light on the paper is perfectly even and free from those dark patches observed when the light is in the wrong position with regard to the condenser. This applies to any illuminant that may be used. The conditions with regard to the position of the sensitive surface to the lens and its distance from it is the same in all enlarging processes, to describe one is to describe all. With the lantern the principal difficulty is the management of the light.

Daylight enlargements are to be preferred in good weather when dense negatives are dealt with. The requisites are a clear sky-space a small window outside of and below which a reflector is placed at an angle of about 45 degrees made of some white material or an ordinary mirror made waterproof as regards its back; a sheet of any white material, but most things save glass or porcelain are easily damaged by exposure to the outside air. There is no condenser required in this case, the camera being fitted to the window with exactly the same precautions as there were taken when fitting it to the condenser. On a fine day the exposure is much more rapid than with the best artificial light, and it is always advisable to make test exposures. Owing to the varying quality of daylight considerable judgment is required for *every* exposure, no definite number of seconds for, five minutes together, can be relied on to produce the same result, unless it is an exceptionally fine day with a steady light.

VIGNETTING.

A *good* vignette is a picture shaded off by imperceptible degrees into the margin, or the background is broken up in an artistic manner, so that its lights and shades shall enhance the value of the picture—a print showing a marginal disc of any definite shape is a bad vignette. Unfortunately we see a good many of them about. As a rule an abrupt edge to the shading of any picture has a disagreeable effect if intended to represent a vignette—to produce a vignetted enlargement a large card with a suitable irregular shaped opening in the centre is moved gently about between the lens and the sensitive surface during exposure, the effect of the movement can be watched on the paper or plate, and a few attempt will so show how to manipulate it, the portion protected from the light by the interposition of the card will of course remain of a whiteness proportionate to the amount of light allowed to fall on it, and the shape of the gradation will be according to the judgment exercised on its movements. Some operators prefer a mask hung to the ceiling by a cord, that when at rest will leave the aperture exactly central for the enlargement. This is kept gently moving during the exposure. Better effects are, in my opinion, produced by a moving screen than by a rigid one fixed near the negative that is to be enlarged, a plan sometimes adopted, but whatever the method, the idea is to gradually soften off the edges of the picture into the plain margin. A *thoroughly good* vignette either of portrait of landscape will always afford pleasure. One of the effects of vignetting is to increase the apparent size of the picture; a small picture well vignetted will appear larger than another printed solid and mounted on a similar mount, and have more interest by reason of the suggestiveness an indefinite outline is sure to induce.

(To be continued.)

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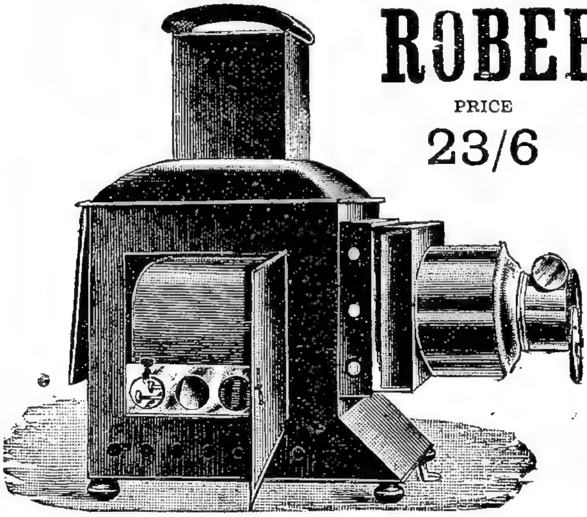

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Daguerre's Lantern Effects without a Lantern.

By W. H. Harrison.

Daguerre was well known throughout Europe long before the invention of photography by Nicephore Niépce and himself was published to the world in 1839. He and Bouton were the inventors of the diorama, and in Paris set up the first one in 1822; it continued to be one of the leading attractions in that city, until the building was burnt down in 1839, shortly before what is known as the Daguerreo type process was made public. So great was the success of the diorama, that a year after its introduction, one was started near Regent's Park, in London, in the Autumn of 1823, by Messrs. Morgan and Pugin, and another was not long afterwards started on a large scale in Berlin, by Carl Gropius, who, like Daguerre, was an eminent scene-painter for the theatres. By means of the diorama, sunlight effects could be changed under the eyes of the spectators, into those of moonlight, representations of accidents by flood, fire, or avalanche, could be given in a manner never before witnessed, and effects somewhat like those of dissolving views could be obtained.

Says Gaston Tissandier, in his "History of Photography," when speaking of Daguerre's diorama:—"That which especially excited the admiration of the spectators, was the gradual changing of the scenes, which appeared, so to speak, to dissolve into one another, one following another without appreciable interruption . . . . One contemplated for example, the Valley of Goldau, where fir trees crowned as with a diadem of verdure, the cottages of a humble village sleeping on the borders of a peaceful lake; then suddenly the sky became gloomy, dark threatening clouds appeared, a violent concussion shook the mountain, the avalanche descended, impetuous, terrible, it rushed on the village, burying it in ruins; to the peaceful picture of but a moment before, had succeeded a dreadful scene of falling and crashing rocks in indescribable confusion." From polytechnic experiences we may imagine what banging of large tea-trays, and shaking of sheets of copper, went on behind the scenes while the rocks were falling, for it was a rock avalanche, part of the top of the mountain slid down into the valley, and the Swiss think that there is more to fall hereafter.

In the representation of the interior of a cathedral, Daguerre would first show it as by daylight, and with empty seats; a dim religious light would then fall over the scene, followed by a deeper gloom; the figures of devotees would appear, lights send forth their radiance from the high altar, and from candles in the church, and the final effect, combined with the solemn pealing of the organ, strongly impressed the spectators.

The most celebrated of the dioramic effects produced by Daguerre and Bouton, were The Midnight Mass, The Landslip in the Valley of Goldau, The Temple of Solomon, and The Cathedral of Sainte Marie de Montreal. In each of these, day and night changes gradually stole over the scene, and in the Midnight Mass, human forms appeared in the cathedral. The scene of the destruction of a village in the valley of Goldau, already mentioned, is well known to most tourists, as it is just behind the Rigi, and at the foot thereof. Thus he produced the more striking effects sometimes now obtained by the aid of the magic lantern.

The substance of his own explanation was, that the canvas is made exceedingly transparent by coats of size, and is painted on both sides. The first effect is painted on the face of the canvas, the second on the back thereof, and the observers see either the one or the other, according to the illumination being from the front or from the back. In painting the back of the canvas, the artist must use no other light than that which comes through the canvas and through the picture on the front. Sometimes during the exhibition, both front and back lights are used at once to modify certain portions of the picture, and sometimes the rays for local illumination, are passed through coloured glasses, or other transparent media. Daguerre also knew the effect, when using one coloured light from the front, of its effect upon different colours of the picture, that is to say, that the pure red light of the spectrum will enhance the brilliancy of the reds in the picture, and will make the parts painted green look black. The preceding description of some of his methods, is condensed from particulars written by Daguerre himself, when he was given in 1839, a pension of two thousand francs a year, by the French Government under Louis Philippe, for revealing "The secret of the diorama." As a matter of fact there was then not much in the way of secret to reveal, dioramas having long previously been established in various cities in Europe. The diorama subject seems to have been made an excuse for awarding to Daguerre two thousand francs a year more than to Isidore Niépce—the successor of his father, then deceased—in the Niépce-Daguerre partnership, yet without giving Isidore technical cause for complaint. In the act awarding the pensions, Niépce and Daguerre were given four thousand francs a year pension each, for the invention of photography, and Daguerre two thousand francs a year extra, for the revealing of the secret of the diorama. A critical examination of original documents of the time indicates, that Arago, who piloted the whole matter through the legislature, had been misled by Daguerre as to certain matters of fact, consequently unwittingly did injustice by being unwise enough to act upon *ex parte* statements. In modern popular histories of photography, which are for the most part untrustworthy because of compilation from previous compilations, also untrustworthy, it is usually stated that the French Government awarded four thousand francs a year to Niépce, and six thousand to Daguerre, for the invention of photography alone.

The first time that Nicéphore Niépce met Daguerre in Paris, and before they had entered into the partnership for photographic research, Daguerre took him to see the diorama, and the description of it by Niépce, shows how much the display resembled those produced in later years, by the employment of two magic lanterns. A description by Niépce of the effects produced, must be more interesting to photographers and to lanternists, than one by anyone else, so it may be mentioned that in a letter to his son Isidore, dated September 4th, 1827, he stated that nothing in Paris had given him more pleasure than Daguerre's diorama. The interior of St. Peter's at Rome, painted by Bouton, was perfect in its illusion, and none he said were finer than two scenes painted by Daguerre, the one of Edinburgh by moonlight at the time of a fire, the other of a Swiss village from the entrance of the main road, and opposite a prodigious mountain covered with eternal snows; the representations were faithful even in the most insignificant details. Niépce added:—"The illusion is even so complete that one is tempted to leave one's seat and cross the plain to clamber to the summit of the mountain. This, I assure you, is not the least exaggeration on my part. The objects either were, or appeared to be, of their own natural size. They are painted on a canvas or taffeta covered with a varnish, having the drawback of sticking, which necessitates care when these species of decorations have to be rolled for transport, as it is difficult in unrolling to avoid tearing." A few days after writing this letter, Niépce left Paris for England *via* Calais, to see his brother Claude, who was then lying dangerously ill at Kew. During this visit he tried to bring the results of his photographic discoveries before the Royal Society, but as he would not state how he obtained them, the Royal Society very properly would pay no attention to the results of a secret process. The Society came better out of this business historically, than it did out of its rejection of Benjamin Franklin's paper on lightning conductors.

At the diorama, the picture was viewed through a large aperture, nearly the full size of the end of the hall, and at such a distance behind the aperture that it could be lit in front from the roof, through a window of ground glass which could not be seen by the auditory. The spectators were in comparative darkness. The intervening distance favoured the illusion, so also did the prolongation inwards towards the picture, of the sides of the large aperture, so that the edges of the painting itself were not visible. The exclusion from the eye, by these arrangments, of other objects by which it might form a comparison, added to the force of the representation. A moderate degree of light sufficed to show the painting, and could be increased or diminished at pleasure, "and that," says W. H. Leeds, "so as to represent the change from ordinary daylight to sunshine, and from sunshine to cloudy weather, or to the obscurity of twilight; also the difference of atmospheric tone attending them; all of which variations gave to the diorama a character of nature and reality, beyond that of any other mode of painting." Some of the changes in lighting, were produced by shifting shutters and curtains in the glazed ceiling; sometimes also, lights from behind shone through the transparent picture, giving brilliant effects far beyond those of the high lights of a painting on an opaque ground. Altogether, Daguerre and Bouton had provided the means of producing a good variety of sensational displays.

Their chief difficulty was one much experienced by photographers in these latter days, before celluloid came into use, namely, that of obtaining a transparent flexible film or sheet, for their pictures. The means by which they succeeded, also what paints to use, and how to lay them on, are all described in Daguerre's book, published in Paris at the end of 1839, so may be seen there by any who wish to go farther into the subject.

Thus for seventeen years before practical photography was born into the world, Daguerre with his diorama in Paris, held an analogous position to that held subsequently by Professor Pepper in London, as an exhibitor of popular dissolving views at the Polytechnic; the latter, however, produced his effects by means of the magic lantern, and the former depended alone upon his skill as a theatrical scenic artist.

Can any of the readers of these pages inform me who originally invented dissolving views? It has been published that certain men made "dissolvers" and their names have been given, but fingers may have been used as dissolvers in

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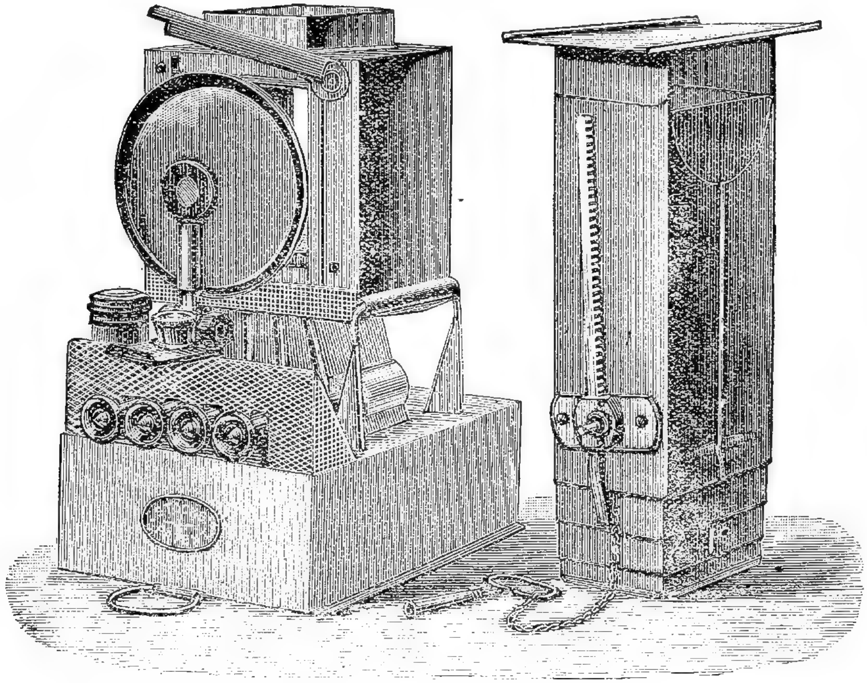

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CHAD

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It is all very well to examine and perhaps admire a Magazine Camera at a dealer's shop or even at home, but practical work in "the field" is the only safe way to test it. Imagine carrying a Magazine Camera for a day over a dusty road; and then imagine the bother with sheathes, or paper-backed plates. But that is not all.

Did you ever know a cyclist to be satisfied with his "Machine" for more than a year? My experience of cyclists is, that they are always changing, and it is quite amusing to hear their arguments in favour of every new machine they get. Well, it is just about the same with Hand Camera men—or worse. I never knew a man yet who was satisfied with a Magazine Hand Camera for more than a season Of course, they were delighted when they got their last "latest novelty," and sang its praises for a week or two; but something goes wrong, and they wish to part with it to get another of a different pattern. Now how is it the same thing does not apply in the case of ordinary Cameras? Why, because there is no bother with magazines or trouble with unnecessary complications. When a man buys a good Half-plate or a Whole-plate Camera he is usually satisfied for years, his only trouble then is the weight; but with one of my Patent Landscape Cameras he has no trouble at all, for he knows that he has the lightest practical Camera on earth. (For particulars see Catalogue.)

My Hand Camera is provided with **Dark Slides**, because they are the most practical of all plate holders. Originally Barnett's Patent Dark Slides were supplied with the Practical Hand Camera, but for small sizes, such as ¼-plate, **Scott's Patent Dark Slide** posseses some advantages, especially for Hand Cameras, so frequently used by beginners. It is now impossible for even an experienced person to light-fog a plate by accident, as by an ingenious spring arrangement the aperture for the shutter of the Dark Slide is automatically closed on the removal of the shutter.

The Scott Dark Slides are in many respects like Barnett's; they are single, each containing one plate—a great advantage, and prevents the possibility of exposing the same plate twice as with double slides. They occupy the same space as Barnett's and fit the same grooves, but they are a little lighter (1 doz. ¼-plate size weigh 1¼ lbs., or 1¾ ozs. each).

There is no limit to the number of plates that may be exposed, for these slides are inexpensive, and if we know beforehand, as we often do, that we are not likely to require more than three or four plates, say on a walk on the pier or promenade, we can go out with as many as we like, say two or three, four or five, or half-a-dozen in the pocket, or twenty if we like, and there is NO FEAR OF A PLATE "STICKING" HALF WAY" as in Magazine Cameras, and no bother with sheathes or paper-backed plates. *Neat little slide cases are provided when necessary See price List, page* 8.) **Films** or **Plates** can be used with equal advantage in these Dark Slides. (*See Film Carriers, page* 8.)

My Camera is **not a fixed focus** instrument, because a fixed focus is not the best, as a very elementary study of photographic optics will show. It is all very well for some tradesmen to say that with "their fixed focus apparatus all objects at 9 feet and beyond are in focus:" of course, this is quite possible under certain conditions, but the assertion is apt to mislead. It is a fact that the shorter the focus of the lens (which implies the smaller the picture), or the smaller the diaphragm

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(which involves a longer exposure), the easier it would be to accomplish what has been stated. Opticians have done a good deal, but they cannot do impossibilities.

Here are a few figures which may be taken as the best that can be done.

A 3-inch focus lens working at F 10 can be made to give good definition of objects at 8 or 9 feet and beyond—but a 3-in. focus lens working at F 10 would not cover a ¼-plate sufficiently well. Now a 4-inch lens working at F 10, would require at least 14 feet to give the same definition, and even this is considered too short in focus for a ¼-plate; so that we must now consider a 5-inch focus lens. The working at F 10 would not define objects at less than 20 feet and beyond, though if we stop it down in the diaphragms to F 15 we may get the same definition at 14 or 15 feet; and to obtain the same sharpness at 9 feet and beyond we must stop down the lens to F 25, and this would be to slow for Hand Camera Work.

Thus it will be seen that a 5-inch focus lens—which is about as short as would be useful for a ¼-plate, embracing an angle of 44°—if used as a "fixed focus" for objects at 20 feet and beyond, no larger stop than F 10 could be used, and if we wished to take nearer objects, say a country market group, or children at play, or hundreds of other subjects at say 14 or 15 feet, the picture would not be sharp, and, as already stated, to be able to take objects so near as 14 or 15 feet with a fixed-focus lens, it must be *adjusted for that distance* and stopped down to F 15, or else objects beyond 15 feet will be out of focus, and this reducing the aperture for near objects is the *very opposite* to that which is required; for it is well known the nearer we approach an object the longer must be the exposure, or the larger must be the stop for the same exposure that would be necessary for more distant objects; then, of course, for near groups, figure subjects, &c., we require a large stop, and are generally willing to sacrifice sharpness in the distant objects.

Therefore it now becomes manifest that by employing an adjustable **focussing instrument** we could leave the stop at F 10, or even increase it to F 8, and by a slight adjustment of the focus, obtain results which with a fixed-focus instrument would be quite impossible.

The **means of focussing** by rack and pinion and the method of using it **is novel**. The focussing button attached to the pinion (shown in Fig. 3, under the strap handle) is about the size of an ordinary overcoat button, and is provided with a heart shape aperture forming a little pointer; through this aperture may be seen a white ivorine tablet or disc, on which is marked an index for the various distances to suit the particular lens in use; **the Camera being available for any suitable lens of from 3 to 5½ in. back focus.**

The user should make his own index, which he can do in three minutes, by means of the focussing screen supplied, afterwards to be described; for assuming that I do not supply the lens, it is quite impossible to provide an index—not knowing the exact focus. On the other hand, assuming that the lens is supplied with the camera, and the index marked in feet or yards, I venture to say that very few Photographers will use it correctly; not one man in half-a-dozen can estimate distances

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the first instance. One of Messrs. Carpenter and Westey's slide-painters claimed to have invented dissolving views, but it does not appear that his claim was much recognised by those who perhaps knew better. In inquiring into this matter some years ago, the best information I could get, which was but of an incomplete character, was to the effect that they were first brought to London by some Italian. The method of their production was a secret for some time, and greatly puzzled the late Dr. W. B. Carpenter.

——:o:——

Shadowgraphs.

By Chas. E. Cottrell.

It is sometimes as well to write for the benefit of juveniles, but I find that in many cases the grown up folks enjoy the matter written for the former, just as much as do the youngsters, many grown people enjoy a game or two with children, and many of us who are anxious to see a pantomime admit that we went to see so and so, "merely to take the children."

Go to any juvenile lantern entertainment and watch the adults who may be present, enjoy seeing such slides, as in our more sober moments we call rediculous. Why I have known a man discourse upon scientific problems on a Monday, having a fine time of it on a Tuesday evening at a youngsters' entertainment. Those who therefore think it absurd to see the following sketches, can take it that it is meant for the benefit of children.

At most domestic lantern shows, there is a time when the screen is devoid of picture, although the light may be on; and the representing upon the screen by the proverbial small boy of some representation by means of his hands, causes no small amount of amusement. Now, with very little practice, some very good representations can be made by what is termed shadowgraphy. I need hardly say that the object, the shadow of which is to be cast upon the screen, must be placed between the lantern and the screen in the rays of light, and one trial will show that the size of the shadow is governed by its relative distance to or from the light.

I have made four sketches showing how in a simple manner various shadows may be cast. Take the first instance viz.: a parrot standing upon a twig. The right hand must be closed and the fore finger allowed to rest upon the tip of the thumb but slightly projecting over it; this hand is held upright, whilst the left is placed immediately below at right angles, the forefinger being extended whilst the other fingers are allowed to droop, to form the tail of the bird, as shown in Fig. 1.

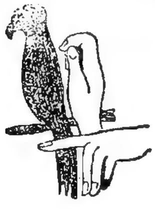
Fig. 1.

No. 2 forms the head of an Indian chief, the particulars need not be described in detail, as I think the sketch is sufficient to explain them. The chief difficulty is to place the knuckles of the right hand so that the nose and chin will be sufficiently defined.

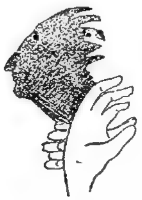
Fig. 2.

A very easy head to show is that depicted at Fig. 3, viz.—the head of a miner, but care must be taken that the first and second fingers of the right hand forms the nose in a pronounced manner.

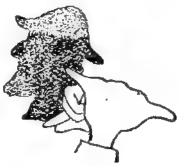
Fig. 3.

The next (Fig. 4) is a somewhat difficult head to make, but if the particulars are mastered we have a good representation of the head of a policeman or soldier as shown in Fig. 4.

A swan and cow's head with horns, are not by any means difficult to make, and should I hear that the above has been of interest to the juvenile readers or perhaps the juveniles of readers, I may at some no distant time, give them some more material to work upon.

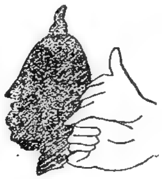
Fig. 4.

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Lantern Slide Methods.*

By C. Weed Barnes.

There is a solid substratum of common sense in the prevailing favour with which lantern-slides are received. They have become an almost essential requisite in these days to any lecturer whose words admit of being made more impressive by adding the evidence of sight to that of hearing. Strangely enough, people will believe their eyes who doubt their ears. This fact being conceded, it remains for me to give some faint idea of the great stature to which this work has grown, what it can be made to mean, and a little—only a little—about how it is done. The old idea of the magic-lantern impresses those who give little thought to camera work with an almost absolute conviction of its being a kind of trick, really sleight-of-hand or magic.

And when they are told that lantern-slide work is a well-defined and not over and above easy branch of photography, requiring constantly growing experience and thoughtful care to accomplish good results, they smile indulgently, if they do not actually say they doubt your statement.

---

* Extract from the Hoboken Camera Club.

One of the strongest reasons for slides being so popular is that so many more people can thus enjoy a picture than when it is in the form of a print, and still more that, with great care and trouble, it may be, one can sometimes obtain from a poor printing negative a respectable slide. This in many cases is valuable, as from it, if made by reduction and properly strengthened, a good negative of any size can be made. The objection that such negatives are usually blurred and indistinct in outline can be largely overcome by making the image on the slide as small as is consistent with clearness, focussing as sharply as possible, timing very carefully and using special pains in development. The advantage is that if such a negative is broken or injured, another can be quickly made from the slide, and where it is difficult to photograph the object over again—always best when that can be done —a camerist need not be at the risk of losing a valuable picture.

Mr. A. R. Dresser, the distinguished English slide-maker, strongly advocates making slides in a copying camera, and it is gratifying to have my own opinion confirmed by such an able worker, for I do not like contact slides as a general thing. He goes to the extent of recommending the process, even with negatives as small as 3¼ in. square.

Some of the advantages in this way of making slides are that you can overcome defects in the negative, leave out any part if wished, enlarge or reduce as desired, and, what always seems miraculous to the uninitiated, make an exposure, develop the plate, and make a slide from the wet negative in a very short space of time, which is, of course, impossible by contact.

It is not necessary to have an elaborate outfit if you only have a good short focus lens, but you must supplement it with a greater output of brain force to devise expedients for overcoming deficiencies in the camera, &c. In visiting a celebrated slide-maker's workroom lately, I was ashamed of my own expensive apparatus when examining the simple means he used. An old, discarded wet-plate camera, slightly altered, an ingenious arrangement for using any size, negative, and a fine lens—the whole was simplicity itself; and yet his slides are known wherever photography is—and that is saying a great deal.

It is not understood by some how much exposure is hastened when snow has fallen, and how very useful is a ground glass behind the negative, or the reason for placing the negative film side to the lens (otherwise the image on the slide would be facing the wrong way), or the absolute necessity for having the front of the camera square with the negative—in other words, how very easy it is to fail and then blame instruments, chemicals, maker or dealer, and not the worker. One special object of blame is the plate, and each camerist has his favourite one, not that it is necessarily in itself the best; but with it he accomplishes the best work. It is, however, with some workers, a case of love me, love my plate, and your judgment is sharply questioned if you are not able to do so. On my saying to a friend once that I did not like a certain make of plates, as the slides were too black and white, the statement was positively, very positively, questioned, and I was obliged to explain in detail that whatever my informant's experience was, mine differed from it.

English plates are much slower than our own, four or five times as long an exposure being requisite, which seems to bear out the theory that in slide work rapidity is undesirable, as the average of English slides are remarkably fine.

As a rule, theirs are denser than ours, but the shadows are generally clear. The American size, 3¼in. by 4in., has been adopted by some English plate-makers; but the majority of their plates are inconvenient for their lanterns, being both for plates and cover-glass square, solid, very substantial, and apparently made with a glorious disregard of whether they suited any slide-carriers but English ones. We claim our way is more convenient, as it allows title and name of maker to be placed prominently on the cover-glass, and gives more latitude in matting. We also mount our slides differently from foreign workers, and it would save much trouble if some general agreement could be arranged in these and other photographic matters.

I spoke recently in Brooklyn on certain slide developers. It does not matter much which one is used, if it is used intelligently; each has good qualities, but those are the best which are simple as to formula, cleanly in working, and reliable in action. I do not like the caustic alkalies, as they are too severe on the film and utterly preclude anything like prolonged development, so essential to a good slide. With eikonogen, my favourite developer, I use carbonate of potash, saturated solution, and sulphate of soda in the eiko, which seems to keep well, if it does darken a little.

The suggestion was recently made to me of using the new developer, rodinal—otherwise para-amidophenol—as an accelerator in eikonogen, and it was a success. Let me urge putting acid sulphite in the hypo bath, and always have a dish with saturated alum and a

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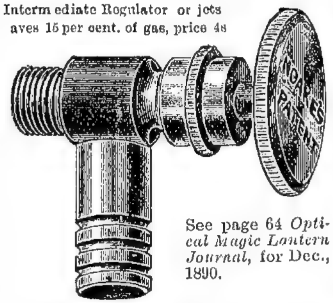

See page 64 *Optical Magic Lantern Journal*, for Dec., 1890.

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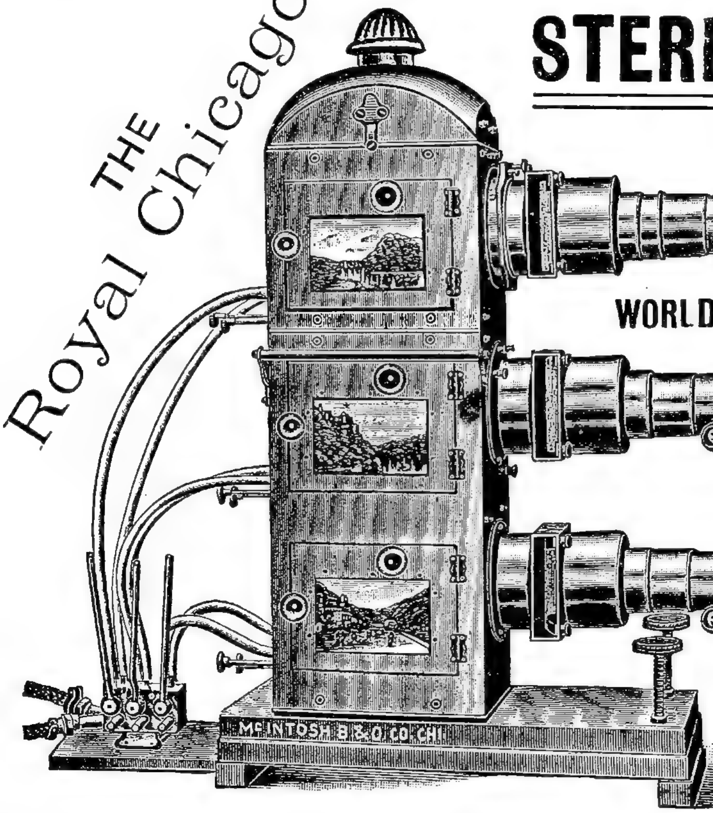

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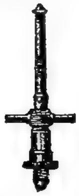

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little sulphuric acid near it. Keep the bromide bottle "convanient," but not too much so, and use a dropper in the cork. See that for all solutions, and washings either distilled or, at least, well-filtered water is used. It is my custom to keep a piece of muslin, filled with absorbent cotton, tied over the rose-sprinkler on my faucet, and it requires renewing every few days, as it gets black with sediment.

In cold weather the water from the pipes should be warmed before use, else the chill will seriously retard development. In my dark room is a gas stove, and I generally, in winter, heat water and put a little in the developer; but only just enough to slightly raise the temperature, remembering one sad experience when I saw the whole film slip off the plate.

Overtiming, development only for detail and subsequent intensifyings, keeping the lights pure and the shadows clear, by judicious use of the alum bath mentioned, will give an interesting variety of tones, which is a relief from the monotony of the usual colour of slides. Uranium and other salts are also employed in gaining variety of tones, but hand-painted slides must be exceptionally well done to be even tolerable.

It is a curious fact that some pictures show better as slides than as prints, especially where there are good distance effects.

There is no earthly reason why, with proper patience and perseverance, anyone who can make a good negative should not make a good slide. If prevented from using a copying camera, he certainly can make them by contact in any ordinary printing frame, but should back his plate with dark material, as frames generally are lined with white canton flannel. I would then advise their being made by gas, magnesium, or electric light, which can be readily controlled. Some workers prefer artificial light in any case. Many of the societies provide facilities for this work, and I constantly wonder that it is not more widely taken up; but it is sadly evident that in every society a few members do the most of this work. While the claim is made still, and very positively, that a wet-plate slide is the only true one, all others being unworthy of consideration, yet high authorities all over the country are beginning to believe that just as good effects can be gained with dry ones.

The amateur, however, after going through all stages of the slide fever with ready-made plates, sometimes becomes fired with an ambition to coat his own plates. There are several ways of doing this, and all, though not expensive, are more or less troublesome; but the genuine camerist devoted to his work never knows when to give up and, as I can testify, never likes to own a positive defeat.

I cannot understand those good people who wonder what there is in photography to make its devotees so very devoted, when discoveries and improvements are being made almost every day in its wide field. Perhaps this is the more strongly impressed on me from the fact that so many instruments, chemicals, &c., are sent to an editor for testing, and the various photographic periodicals, foreign and American, fairly bewilder the novice with the extent to which the work is being carried. One very tempting path is in the direction of different printing methods, experimenting with new printing surfaces and developers, and here is where there is boundless capacity for improvement, while with slides there is less variety in the material used; but a great deal in how it is manipulated. Success is, however, impossible, unless one thoroughly believes that what he is doing is worthy of his best energies, no matter what the line of endeavour, but that blindly sticking to it will never accomplish anything really valuable. What is required is steady, wide-open-eyed perseverance and cultivation, but a perpetual post-graduate course in accurate reasoning. The scales and weights on one's shelves then become something more than senseless machines, and are as symbols of the wonderful balance and delicate adjustment of the human brain. You will only get from photography that which you give it; but one can give a great deal, and if you make yourself believe that in it no art is possible, you will certainly never find any. He who seeks will find.

To succeed you must read intelligently, study carefully, believe it is worth while to give your best attention to camera-work, and then translate your study into practice, watching critically every step, and cutting places for your feet as do the climbers on the Alpine glaciers. No sudden flights of inspiration will carry you very far, although inspiration is needed sometimes to keep up one's courage. I wish to urge, at the same time, the never being satisfied with one's work. Avoid that as you would a pestilence; it is fatal to further progress. Your satisfaction will be like that of the five little green peas in Hans Christian Andersen's story, whose own tiny pod was all the world to them. While measuring yourself against others, and learning to realise your own shortcomings, you will often find, by the great law of compensations, an unexpected balance on the credit side of your account, but it must be fairly earned. This talk has not been intended for a strictly scientific one, but only to show those of you who have paid little, if any, attention to this subject, that it is worth being well considered for the sake of the future before it and what can be made of it.

The work can be made a valuable adjunct in educational training, if used to instruct as well as amuse. It is fascinating work, and from personal experience I recommend it to all camerists, men and women, believing there should be no sex in photography; each should bear the burden and heat of the dark-room, do the same work throughout, share equal criticism and receive the same reward.

——:o:——

The Lanternists Den. No. VI.

By C. E. Rendle.

Notes on Making a Lamp (*Continued*).

The wick holders being now soldered in position, the next thing will be to finish them off one by one, that the whole may be mounted to cistern. Place these holders before you, looking as it were through them, with cylinders at your right hand; just the reverse to Fig. 7. This is the back, or, as before described, the button end. Be particular on this point, or the wicks will turn left handed.

Attention must now return to Fig. 3. Take one of these apart, and first solder concave cap A, button end, over cylindrical part of wick holder, then put rod carrying wheels through the reverse or open end of cylinder, and then through hole of cap just fixed up to socket, or as far as it will go, place the front cap on, first seeing that the pivot is in its proper place. Possibly this will require some slight regulation, and might with advantage be left a trifle long.

If, when the cap is in its position, the rod turns evenly and smoothly, it may be soldered. Before, however, making the whole a fixture, remove once again the cap, and paint the pivot with wet whiting, which in a measure prevents the solder going near it. Replace the cap in position, and use the utmost care in applying the heat, directing the flame if possible only on the very edge of the cap. This done and cleaned off, the other three cylinders may be treated in the same way. The buttons need not yet be fastened on.

The line EE, Fig. 7, represents the top of cistern, and it will be seen that a small piece of each wick holder goes through—$\frac{1}{8}$th of an inch is sufficient. We can now proceed to cut slots in top, to allow these four tubes in, as will be seen at C, Fig. 1.

Place the holders on top of cistern in exact centre, and hold with left hand, while tracing around the base of each with a sharp point. Remove the holders, and if need be mark more plainly the pieces that are to be taken away. If possible place a hard block of wood in the vice, so that the cistern body can fit over it. It may be found advantageous for some friend to hold it steady and in position, while the worker proceeds to cut by aid of a small cold chisel, and hammer down the lines where the gaps are to be made. If this is done carefully no difficulty will be experienced in cutting out the four apertures and fitting in the four wick holders. When executed they must be soldered from the inside with only sufficient heat applied to well flush the solder. Very particular care must be taken in seeing that each seam is well filled up, for if at a later period a leakage is discovered, it will be very awkward to put it right. Another glance at Fig. 1. D is a hole to receive the filler. This filler (Fig. 8) can be bought at any lamp makers, and can be let in at position indicated, but for convenience should stand up, say $\frac{3}{4}$in. from top; it will also be found best to solder from inside.

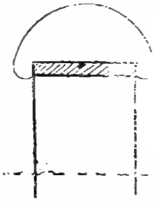

Fig. 8.

After each seam is examined and found satisfactory as to its soundness, proceed to solder on to bottom. A margin of $\frac{1}{2}$ in. all round is enough for projection, but if intended only to use the lamp in a particular lantern, it will be found best to cut bottom and fit to that lantern. There is no harm done however in leaving it full large as an after experience may show; for the centre of illuminant must centre with condenser, and as this cannot be gauged without seeing the lantern, any extra overlap may be used to advantage in raising, or lowering, in order to achieve the desired end. Having ascertained that the bottom is flat, and the body fits nicely to it all round, lay on a piece of flat wood, and first place solder on one side only, hold the whole steady with the hand while the solder is flowing, when this has been done, proceed to sides two, three and four, each in its turn, allowing just time for each to cool down. When this part of the work has been finished and cleaned off, the lamp will begin to take a formidable appearance.

There are some other little details of equal importance still to be added ere this part of the task is complete, but as they are comparatively easy we will hasten to get them over.

Cut off two 8in. lengths of wire, mark each 1$\frac{3}{4}$in. from ends, screw in vice, respectively at mark and bend at right angles. These form the sides (Fig. 9), the supports A A being made in the following way: Prepare two pieces of tin 2$\frac{1}{2}$in. square, draw lines from corner to

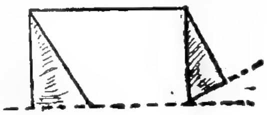

Fig. 9.

"THE BLACKFRIARS"
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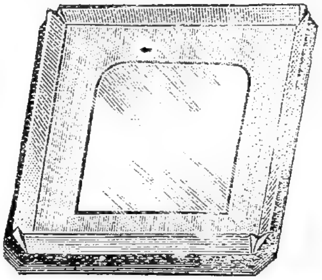
(PATENT APPLIED FOR)



This is undoubtedly the latest novelty and most complete article of this description, and will enable the most inexperienced amateur to bind his Lantern Slides without any trouble. Having simply to put the Masks between the slide and cover glass, wet the edges, and turn them over all round, which completes the operation.

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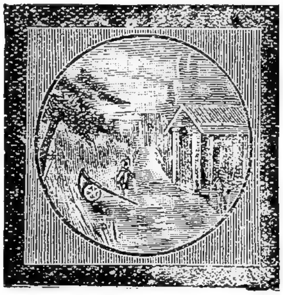

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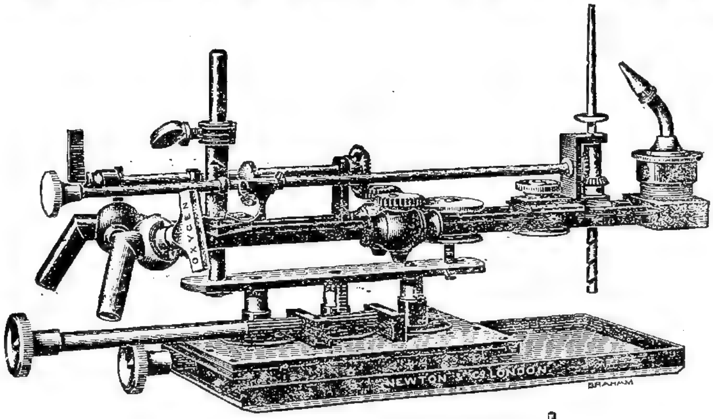

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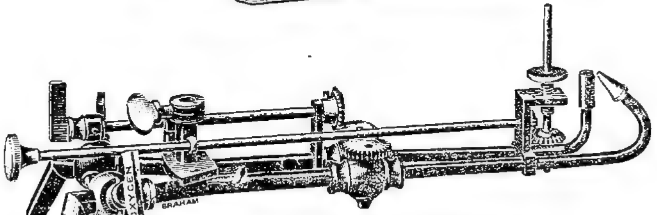

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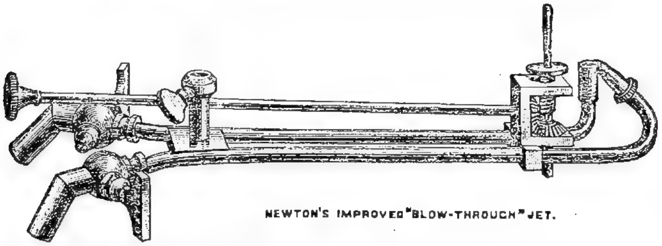

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corner (Fig 10), cutting through the dotted line A A. Each triangular piece may now be bent nearly double, a short length of wire being placed at line B while the bend is made, so when complete the clamped tin will fit on ends of each side. Fix with solder in position as indicated in Fig. 9. The support A running parallel with wick-rods must be soldered at bottom end of cistern; support B cross-wise. Fit a piece of perforated zinc and fit across back, cutting spaces for rods to project through. Before making this back-guard a fixture, solder the buttons to rods one at the time, after which the zinc guard may be secured at each end, also with solder.

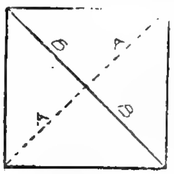


Fig 10.

The next thing to claim attenion will be the reflector, which can be purchased for a few pence at any good lantern sundriesman's. This should be of copper, or better still, white metal, and if properly silvered, will last a considerable time; 3in. diameter is a convenient size. Make a bridge (Fig. 11) to which to fix this, as follows: S is a socket or joint and can easily be made by turning a strip of tin ½-in. wide round a piece of wire; A is an arch piece, and should be so shaped that it may fit to wire sufficient to keep bridge steady; W is a wire running from S to A, and to which reflector is fixed. The object will at once be apparent, as it can be moved from right to left, to look at light, can also be moved from the light or nearer to it as desired.

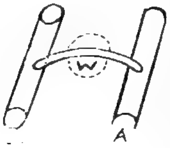


Fig. 11.

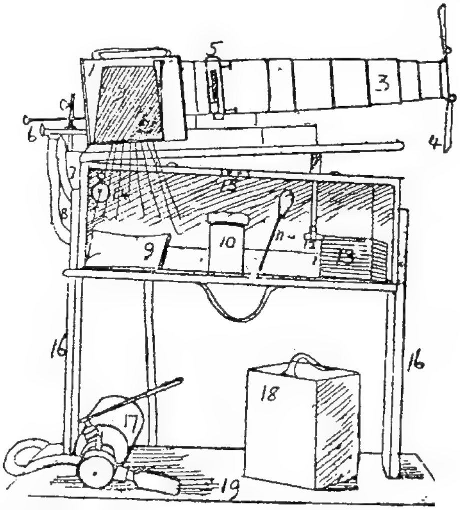
(*To be continued*).

—:o:—

My Lantern.

By E. H. Stevenson (Norwich).

The article in a previous issue of the *Optical Lantern Journal*, descriptive of "My Lantern," has brought a large number of letters from various parts of the country, asking for further information about this instrument. I have, therefore, had another photograph taken of the other side of the lantern, and the annexed sketch is from the photo. What I would like particularly to draw attention to is, that the light in the lantern not only projects the picture on the screen, but also illuminates the lecturer's notes, and this in a more effective way than the best reading lamp, and at a place where it can in no way affect the picture. I have often seen the corner of a very brilliantly illuminated disc spoilt by the light from the lecturer's lamp.



1. Body of lantern made of Russian iron, into which the whole of the other part of the lantern goes when packed for travelling.

2. Shade for reflecting the light from the lantern to the lecturer's notes, &c. The door of the lantern is opened, and in its place this shade is fixed, and a flood of light is conveyed to the shelf beneath. To one who manipulates his lantern and lectures at the same time this is *invaluable*. If the light is too strong, a piece of ground or opal glass may be placed in the shade, but I find my light burns all the brighter through having this current of air introduced into the lantern here.

3. A collar, by turning which, the front lenses are focussed.

4. Two brass flaps, which hold squares of coloured glass which may be instantly changed. These tinting glasses produce very pretty effects upon plain slides, and are moved by two milled heads.

5. Beard's Eclipse Carrier, which brings the used slide back to the same spot as it was put in, and in changing the slides acts with a dissolving effect. It is quite *open at this side*, and with the pointer (11) it is the simplest thing in the world to point to any spot on the slides—line of a hymn, place on a map, &c., and the audience will see the pointer on the screen much more plainly than by an ordinary pointer used by a lecturer at the screen.

6. Newton's jet, with Noakes' patent intermediate gas regulators in place of ordinary taps.

7 and 8. Two tubes leading from saturator, which hangs on the other side of the box; 7

conveying the pure oxygen, and 8, oxygen saturated with ether to the jet.

9. Lecturer's notes.
10. Brass box containing limes.
11. Pointer, an ordinary knitting pin fastened in a handle.
12. Long screws, by means of which the lantern can be elevated to any angle.
13. Slides.
14. Watch, a very necessary article to be kept before long-winded lecturers. The watch is well illuminated by light from lantern.
15. The box, which forms the lantern stand. This box is made to contain, when travelling, the saturator, regulator, gauge, tubing, slides, limes, carrier, and the several other things which are necessary to complete a limelight lantern outfit. The box is elevated to its proper position by two legs (16), which in transit make a partition down the middle of the box. The lid of the box forms the lecturer's desk, on which lies the MSS. The lantern, when in the position shown, and standing upon an ordinary table, will project the picture over the heads of all the audience who may sit quite up to the table on every side.
17. Cylinder of oxygen, with Beard's regulator and gauge. The gas is conveyed to the saturator by a larger and thicker tube than the two tubes 7 and 8.
18. The box, less than 8in. square, which carries the lantern complete, with its condensers, objective, &c.
19. Ordinary table.

——:o:——

Correspondence.

EXPOSURE TABLE.

[To the Editor.]

Dear Sir,—In table 2 of our Exposure Table, a slight printer's error has occurred, and which we regret we overlooked. The three first columns headed respectively $\frac{F}{6}$, $\frac{F}{8}$ and $\frac{F}{11}$, should have been headed $\frac{F}{8}$, $\frac{F}{11}$ and $\frac{F}{16}$.

Thanking you in anticipation for inserting this correction.—We are, Dear Sir, Yours faithfully,

Barnet. ELLIOTT & SON.

RAILWAY RATES FOR GAS CYLINDERS.

To the Editor.

Sir,—Your readers will be pleased to learn that the Railway Companies representing the larger lines. Northern, Midland, North Western and Great Western, have reverted to the old rates for conveyance of gas cylinders. Therefore they will no longer have to take into account the increased cost of gas from advanced charges in carriage by goods train, and consequently can send their cylinders as heretofore, by that conveyance, when time is not of serious consequence.—Yours truly,

406, Strand. J. H. STEWARD.

LANTERN CONDENSERS.

[To the Editor.]

Sir,—I must "sit corrected" by Mr. Harrison. I have no experience whatever with triple condensers, and my statement was simply a repetition of the opinion of three different makers, given at the time I was looking out for a first-rate lantern for physical demonstrations. Possibly the triple condensers they used might not have been suitable for dividing, hence the opinion given. I do not care to discuss matters with Mr. Chadwick, as, from the tone of his letter, he appears to be a gentleman who loses his temper in a very rapid manner; and without intending to discuss the matter further, I may say that I should not care to use the back lens of a condenser, which might be very hot, in a vertical arrangement under trays containing liquids which are liable to spilling or splashing; but this is no reason why others should not do so if they choose.

With regard to Mr. Harrison's remarks about gas-burners for lantern use, a satisfactory gas-light with ordinary coal-gas is not a very promising subject for experiments. The flame of ordinary coal-gas is, for its power, very large, this for general illumination is a distinct advantage, as the size of the flame softens the edges of shadows and makes the light pleasanter than when it is obtained from a small radiant point. For lantern work this is a very decided objection, and it would appear that the present three or four-wick lamps are not at all likely to be superseded.

Warrington. THOS. FLETCHER.

TO LIVERPOOL LANTERNISTS.

(To the Editor.)

Sir,—I should like, through the medium of your paper, to ask lanternists in Liverpool and district, whether by combination, we could not obtain some reduction in the cost of hire of cylinders and slides, &c. We are charged 1s. per dozen for slides, regardless of the quantity, 6d. for cylinder and 1s. for regulator, no matter how short the hire may be. I see slides may be obtained in Manchester at 2s. 6d. per set of any number; in Bradford, 3s. per 50; while in London the charge is 4s. for 50 and upwards. In many cases no charge is made for use of cylinder if returned within a week; moreover, if, say, six slides are hired, the charge is 1s., that being the minimum for slides.

I would also point out that much more care in the measurement of the returned gas is needed. On one occasion I was charged for four feet, after four hours use; on another occasion seven feet for three-quarters of an hour.

There must be many lanternists in Liverpool who feel they are overcharged, and by arrangement with some outside firm, or otherwise, we may possibly get more reasonable charges.—Yours truly,

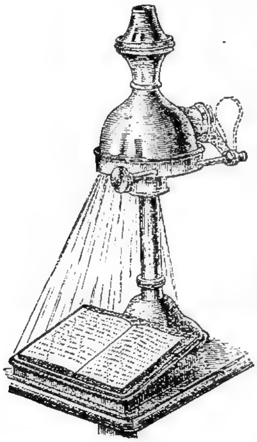
LANTERNIST.

PIRACY OF SLIDES.

[To the Editor.]

Dear Sir,—I regret to say that a set of original lantern slides on bee-keeping, which I have taken some pains with during some years, has been pirated. A clergyman to whom I supplied a set from my negatives has copied them without permission, and is now offering them both for sale at low prices and for hire. I care very little about the sale of slides, but I do care that my name should be discredited by the exhibition of miserable copies of my original work, if I may judge of their quality by a number which a purchaser sent me to look at.—Yours truly, ALFRED WATKINS.

Hon. Sec. Herefordshire Bee-Keepers' Association.



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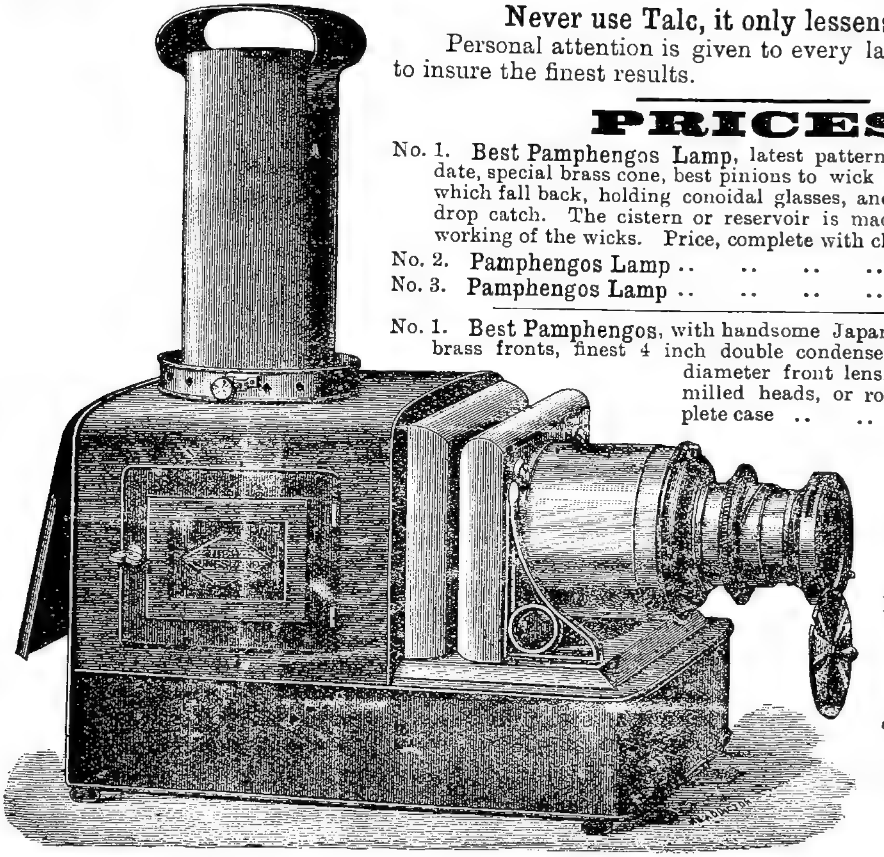

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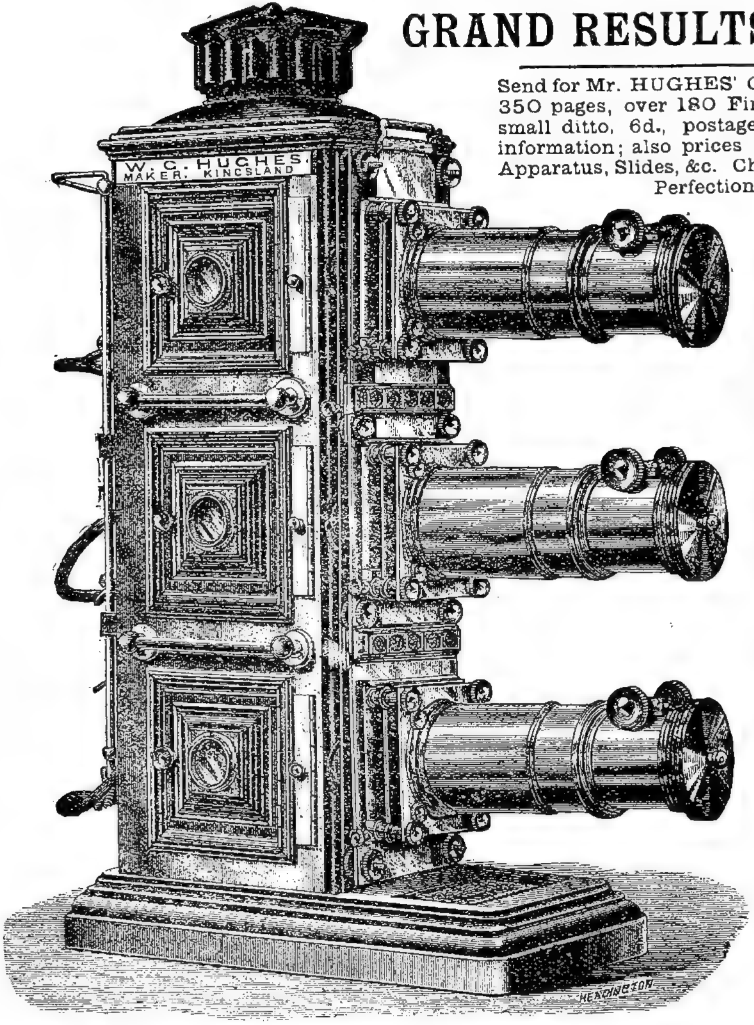

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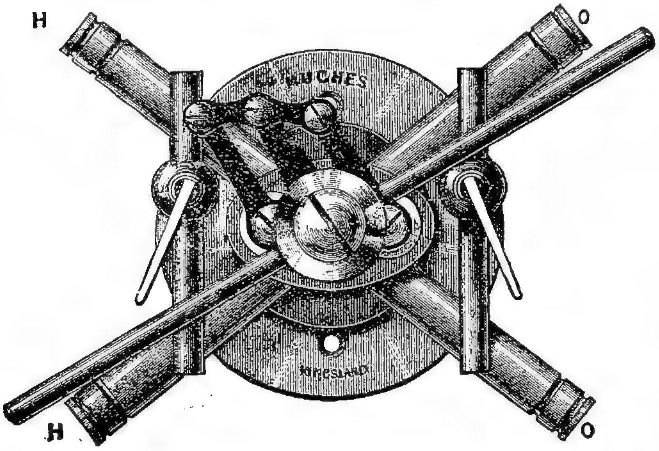

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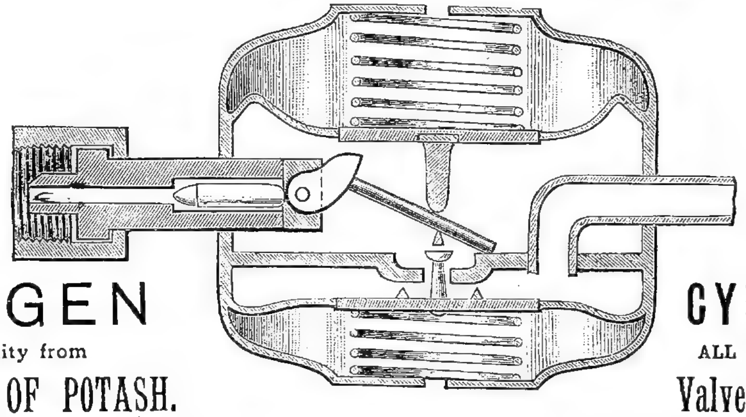

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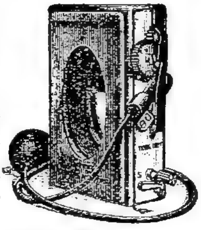

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GAS-BAGS, &c.

[*To the Editor.*]

Sir,—I beg to protest against the growing practice of writers and speakers on lantern topics, of ignoring the claims to consideration of those who, like myself, use gas in bags. The latest offender in this respect is Mr. C. G. Norton, whose admirable paper on the triple lantern appeared in your last issue; gas-bags being therein disposed of with an illusion to "good and cheap compressed gas." Leaving compressed coal-gas out of the question, the goodness of compressed oxygen is considerably discounted by the results of analyses given on page 31, and perhaps Mr. Norton will kindly explain what he means by "cheap." At present I can make gas from chlorate of potash, pure and free from chlorine, at a cost of less than 2½d. per foot, so that, considering the many disadvantages attending its use, and being entirely at the mercy of dealer, compresser, and carrier, not to mention the questionable quality, shall certainly leave the compressed article alone until it can be had considerably under 1½d. per foot, including carriage. The trouble and mess so often objected to, are reduced to a minimum, with suitable apparatus and common sense, and the time occupied does not count, as, once started, a retort can be left to itself within earshot, while other arrangements are proceeded with. I am aware, however, that with the all-too-numerous class of exhibitors who do not start erecting the screen till the time for doors to be opened, the cylinder is a sine qua non.—Yours faithfully, EXPERT.

PROJECTION AND ENLARGING APPARATUS.

(*To the Editor.*)

Sir,—I think it would supply a felt want, if any amateur photographic lanternist, can from personal experience, recommend a really successful "combination optical projection, and enlarging lantern," costing, say about £5, or thereabout, which will effectively exhibit the usual size of lantern slides, and also enlarge properly from quarter-plate negatives, with say a 5 in. condenser, and a 3 or 4 wick oil lamp, to be compact, and not too heavy, or cumbersome.

Perhaps some of our learned professionals, or distinguished amateurs, like Mr. Andrew Pringle, will also favour us with their opinion on this matter, and if the one condenser will do for both purposes.—I am, &c.,

J. S. L.

OXYGEN FROM CYLINDER AND GAS FROM THE MAIN, WITH A MIXED JET.

(*To the Editor.*)

Dear Sir,—I am informed that it is very dangerous with a *mixed* jet, to use O from cylinder, and H from an ordinary gas bracket; does not the following argument prove this illogical? I have (for the sake of illustration) a 40 ft. O full, and a 40 ft. H only half full, both fitted with Beard's regulators; now the actual cubic contents of these is, roughly, about 2 ft. each; well, after using the lantern for some time, we have consumed, say 15 ft. O, and 18 ft. (allowing for the bye-pass) H, consequently there remains in the former cylinder 25 ft. of gas, but in the latter, only 2 ft. thereof, this 2 ft. just fills the cylinder, and consequently has absolutely *no pressure at all*, and in fact, would not come out, were it not lighter than the air. Now the H from a bracket has *always* pressure *from the meter*; therefore, if I use the H from this bracket, and attach the tubing from same to the connecting screw of a regulator, the supply pipe from the lantern being as usual fixed to the outlet pipe, how can an accident possibly occur? for upon the O supply becoming exhausted, I cannot see that there is any greater danger of a suck-back taking place, than with two cylinders. I shall be glad to have a critical opinion of my theory.—Yours truly, A. B. SPAWFORTH.

COMPRESSED CHALK FOR LIMELIGHT.

[*To the Editor.*]

Sir,—Most lanternists know that a piece of chalk can be used as a stop-gap for a short time in the event of the supply of limes running out, and the brilliancy of the light obtained therefrom was demonstrated at Mr. Norton's recent lecture (which I may here say was very instructive). Chalk under great heat will run, but this is I think due to the want of closeness in the particles of which the lump is formed. I understand that under great heat and a pressure of 15 or 20 atmospheres chalk can be converted into an exceedingly hard substance with a fine grain. I would, therefore, like to put this question before your readers, "Would not chalk so treated answer well for limelight purposes and be more lasting than the best of the lime cylinders in present use?" From the paper by Mr. Haddon, which I read in your February issue, I feel assured that that gentleman must be well up in chemistry; perhaps he will kindly express his opinion on the subject of compressed chalk for limelight.—Yours truly,

"LIGHT, MORE LIGHT."

—:o:—

Editorial Table.

Catalogue.—A neat and well printed catalogue comes to hand from Messrs. Archer & Sons, Liverpool. We learn from it that they have introduced a new vegetable oil for lanterns, which it is claimed gives neither smell nor smoke, and is 15% more economical than paraffin. In the way of lanterns we find them of all prices, from 2s. 6d. to £50. One of the special features is their new Unilux Bi-unial Lantern (a description of which we gave in this journal for December last). Working directions are giving in some half-a-dozen pages, and a good list of slides in stock enumerated. Messrs. Archer also make a distinctive feature of giving practical instruction in the manipulating of lanterns.

Our thanks are due to the publisher of the *Photographic Times*, New York, for a handsome circular calendar with movable pointer, which now hangs over our editorial desk.

We have received the first No. of *The Photographic Gazette*, the journal of the West Surrey Photographic Society. It contains 12 pages of interesting matter, and is edited by Mr. George H. James, 61, Battersea Rise, S.W. The Gazette is quarto in size, and is priced 2d.

—:o:—

Notes and Queries.

H. S.—"Soap bubbles, and how to make them," is published by the Society for Promoting Christian Knowledge, Northumberland Avenue, Charing Cross, S.W. You can probably obtain "Science at Home," from Woodburytype Co., 26, Colebrook Road, London, N.

E. Baker (Salisbury).—Sorry your interesting article has had to left out of this issue for want of room.—In our next.

S, directs our attention to the following answer given to a correspondent in a photographic journal, of Feb. 3, and asks if there is any sense in it "*Why not use a saturator? This will do away with the use of bags and cylinders altogether?*" *Answer.*—As the question was not given in our contemporary, we do not know the context, but as a statement it is nonsence. Had the sentence been continued thus, "*so far as the supply of hydrogen is concerned,*" then would it be correct.

Novice.—The condenser next the light has to collect and project a parallel beam to the mirror, and the light must be placed at the focal point; this you say is so far distant, that you lose much light, why not bring it closer and interpose a miniscus lens between the light and lens. B's function is to bring the parallel rays reflected from the mirror to a focus at the objective, and should be such as to suit the objective you intend using, according to the size of disc you desire, at a particular distance. See our "Reference Table,"

S. W. S,—Sorry too late to have other block made.

Charles E. Stewart.—1. The double combination is certainly better. 2. A little loss of light. 3. Using the one lens, or the two screwed closer together. 4. For ordinary work 5¼ inches will do very well.

Cornwall.—1. From the explosion you got when applying a glowing match at the time you were making the oxygen, it is evident there was some impurity in the manganese, or that oil or grease was present at the joints. 2. If you always make the retort so hot, the wonder is that you have not had an accident before. A *dull* red heat if seen in the dark is ample. There is rather a disadvantage in the gas coming off so quickly.

Enquirer.—The Broughton stand would make an admirable lantern support. It can be raised to any desired height.

A. B. Sprawforth.—The hydrogen should be allowed to pass a little before the oxygen, and we understood this point was always attended to by the firm you mention. Write them, they may alter the plug a little,

Amateur.—You will find three regulators advertised in our columns, either of these will answer your purpose.

Capacity asks, how can I tell the contents of any particular size of gas cylinder, when I use a gauge (advertised in your columns), which shows the atmospheres, my bottle holds 10 ft. when full? *Answer.*—All cylinders are charged up to 120 atmospheres, and when full will show this number on the gauge. If your cylinder is a 10 ft. one, work it out mentally as follows, 120 divided by 10, gives 12. Therefore the gas in a 10 ft. bottle will be the twelfth of the number of atmospheres, shown on the gauge. If the cylindier be a 12 ft. one, the atmospheres registered should be divided by 10, other sizes are treated in like manner.

Country writes:—When in London I noticed in several shops a peculiar form of gas burner which gave a small and intense flame of a slightly greenish colour. Can you give me any particulars of how the burner is formed, as I think it might be useful for lantern purposes. *Answer.*—We presume you have reference to the burner of the Incandescent Gas Light Co. These burners can be used with ordinary house gas, or the gas can be made at the time of using. You will find full particulars and illustrations of this form of lighting in our issue for December, 1891.

R. T.—A will suit your purpose better than B.

Scholasticus.—In this issue you will find an article on Colouring Slides II. If you write to Mr. Stedman (see advertisement), whose house is near you, you may perhaps arrange with that gentleman to get a few lessons in colouring slides.

Wm. Joicey writes: I am a beginner in lantern matters and write you for particulars respecting the use of a limelight jet. I got one with the box part filled with slabs of metal containing holes, which the shopman at Messrs. —— told me was for mixing the hydrogen and oxygen, and also that after mixing these gases in proper proportions and placing a piece of lime on the pin I would get a brilliant light. Now I have tried mixing them in different degrees, but I fail to get any light whatever, all that I can get is a whistling sound at the end of the blowpipe. Will you kindly tell me how much to turn on each tap to get them inflamable. *Answer.*—You have without doubt got an inflamable mixture during your experiments with your jet, but surely you do not expect the gases to ignite spontaneously. Turn on the hydrogen a little and apply a lighted match, then adjust the oxygen until you get the best effect. After reading this it may dawn upon you that a flame should be applied to the jet and that the gases do not commence burning simply because you have mixed them in certain proportions.

Robt. Chandler.—You send us three pages about two lenses which you have, and ask which is the better for use with a lantern. You can decide for yourself if you will just hold them in place and try the effect upon the screen.

Ph. Brigham asks: Can you tell me what a "telephotus" is. *Answer.*—It is an instrument for signaling at a distance by means of lights, but we have no furthur particulars.

Allahabad.—The cabinet lens will perhaps be the better, but why not try both lenses as you possess them.

Mr. J. W. Garbutt the lanternist to the Gilchrist Science Lectures, has removed from Waverley Terrace, Leopold Street, to more commodious premises at 10, Edinburgh Grove, Upper Armley, Leeds.

——:o:——

WHAT ADVERTISERS SAY!

LOST AND FOUND.

Messrs. Hill & Son write to say that they have, through their advertisements found a customer whom they had lost since 1852; also that the "Polytechnic" have been making inquiries for their address for the past two years, and that it was through their advertisement in *The Optical Magic Lantern Journal* that they have again commenced to paint slides for this institution; their connection with it having ceased since the days of Professor Pepper, at which time most of the work was produced by their firm, which was at that time Childe & Hill.

* * *

Mr. Week's writes: "Thanks to our able little *Optical Magic Lantern Journal,* I am now very full of orders for next season. Had it not been for this means of making myself and whereabout known, I might have stopped under the proverbial "bushel" till now."

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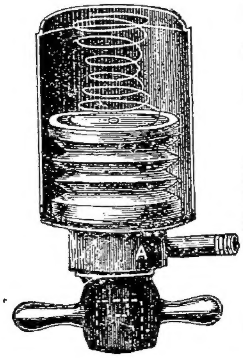

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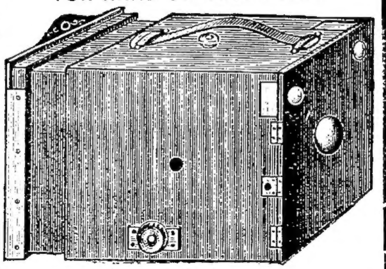

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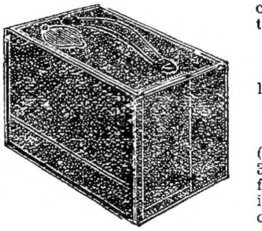

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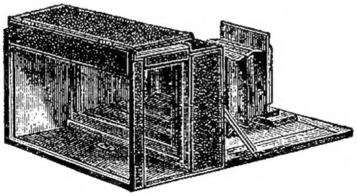

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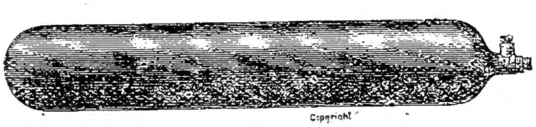

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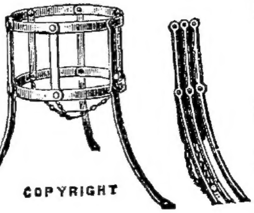

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